

Aligning electrospun PAN fibers by dielectric substrate patterns

Christian Hellert, Jan Lukas Storck, Timo Grothe, Andrea Ehrmann*

Bielefeld University of Applied Sciences, Faculty of Engineering and Mathematics, Interaktion 1, 33619 Bielefeld, Germany

* *andrea.ehrmann@fh-bielefeld.de*

Keywords. electrospinning, polyacrylonitrile (PAN), fiber orientation, dielectric

Abstract.

During electrospinning, the flying nanofibers can be attracted by conductive areas such as copper tape on a non-conductive substrate, especially in case of magnetic nanofibers [1]. The question arises, however, whether the conductivity or any other physical properties of these areas are responsible for this effect.

Here we report on electrospinning polyacrylonitrile (PAN) on non-conductive polypropylene (PP) substrates, modified with conductive copper tape as well as with diverse coatings with varying dielectric constants. The results show that in case of non-magnetic PAN fibers, especially BaTiO₃ with its high dielectric constant strongly attracts the fibers formed during electrospinning which can be explained by local modification of the electric field due to the introduced dielectric. This process can be used to tailor the nanofiber mat thickness depending on the position.

[1] J. L. Storck, T. Grothe, A. Mamun, L. Sabantina, M. Klöcker, T. Blachowicz, A. Ehrmann, Orientation of electrospun magnetic nanofibers near conductive areas, *Materials* **13**, 47 (2020)